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2009

Center for Coastal Resources Management Annual Report 2009

Center for Coastal Resources Management, Virginia Institute of Marine Science

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Center for Coastal Resources Management

Annual Report 2009

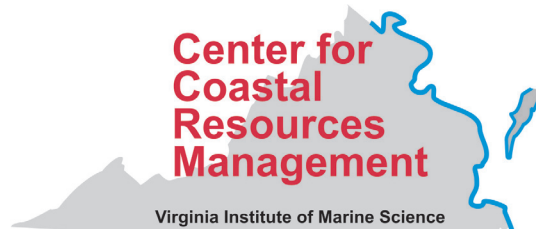
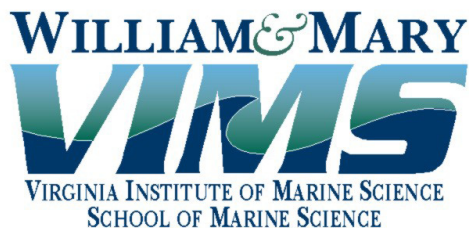
Center for
Coastal
Resources
Management

Virginia Institute of Marine Science

“The Wetlands Program provides extensive support to the Commonwealth’s tidal wetlands and subaqueous lands management programs through review of individual tidal wetland permit applications, training for local and state managers, and development/management of data bases supporting and tracking regulatory program activities.”

Center for Coastal Resources Management

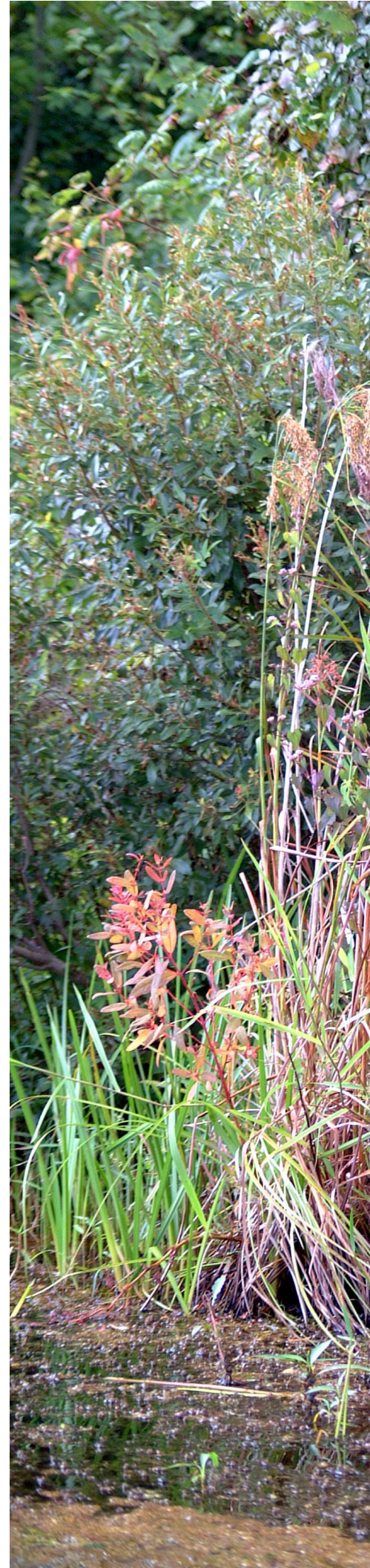
2009 Annual Report



Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, Virginia 23062

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CENTER PROGRAMS

Freshwater mixed community

Background

The Center for Coastal Resources Management exists to develop and support integrated and adaptive management of coastal zone resources. To fulfill this mission, the Center undertakes research, provides advisory service, and conducts outreach education. These tasks are carried out by a staff of professional scientists and technical experts using a mix of state funding and grant/contract support.

Within its broader mission, the Center has specific tasks to support Virginia's wetlands and shoreline management programs. These core activities create a natural focus on the littoral zone and riparian lands in coastal and estuarine areas. Management of resources in these areas has evolved from resource-specific considerations to system-level perspectives. The Center has been an active agent in this change, and has developed the required internal capabilities and external collaborations to support multidisciplinary approaches to management and policy issues.

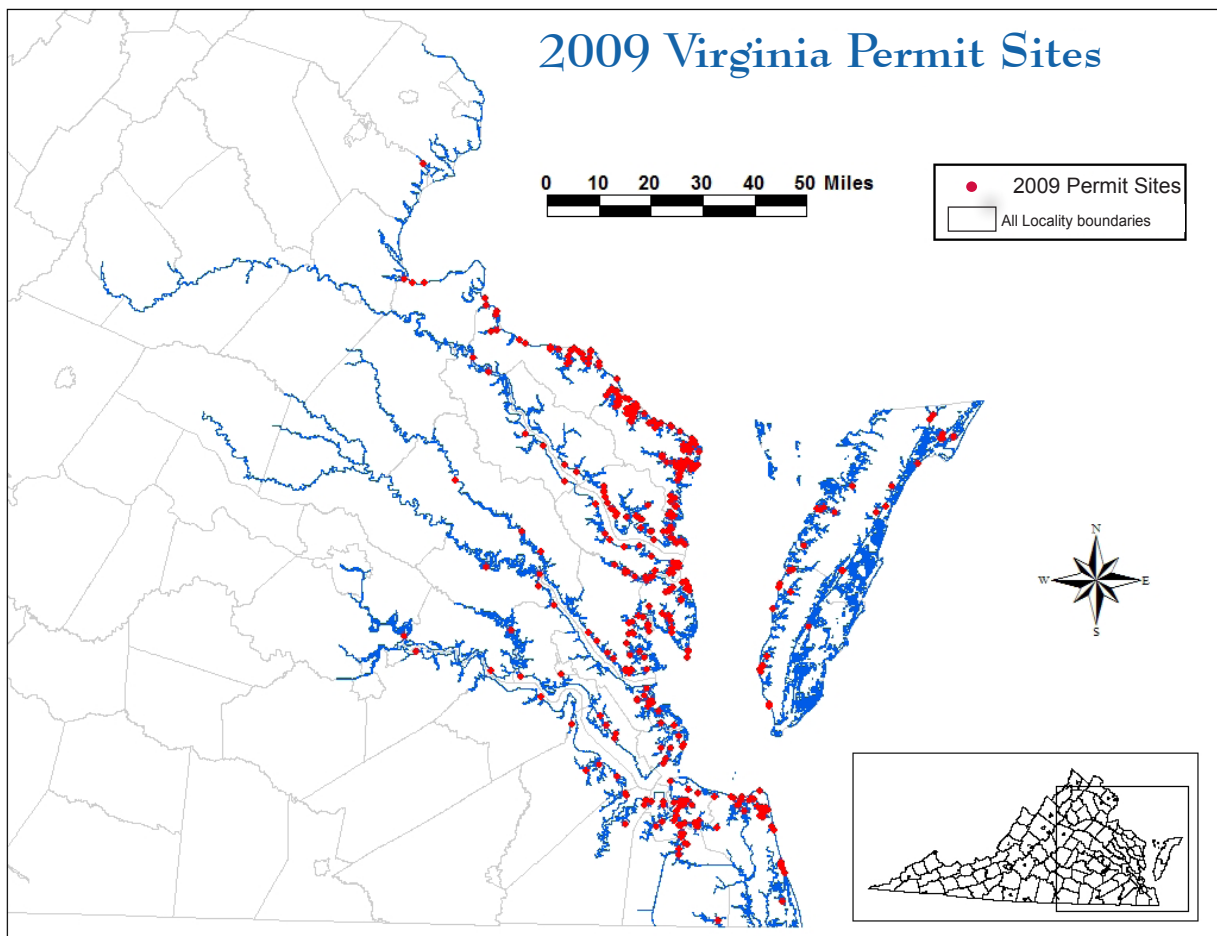
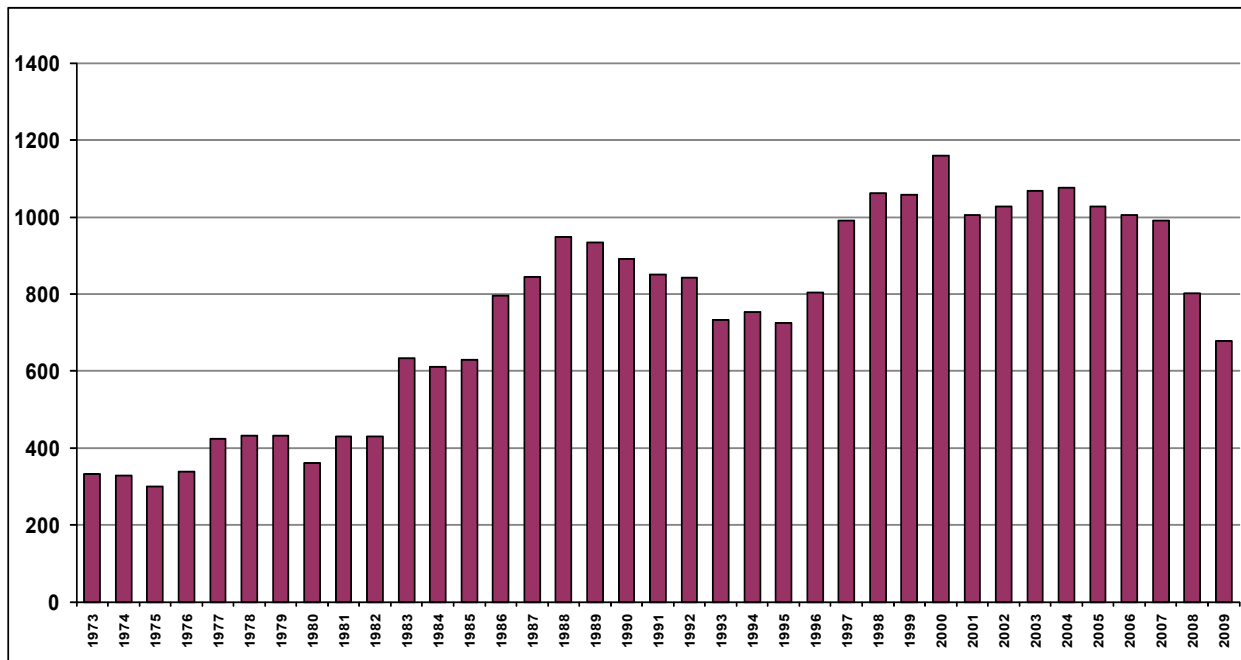
The Center currently manages its multiple activities within three broad and interacting programs.

The Wetlands Program



The Wetlands Program deals with both tidal and nontidal wetlands. The program conducts basic research on the structure and functions of these systems, collaborating with researchers throughout the mid-Atlantic region. A wide variety of applied research is also undertaken. This includes policy option analysis, functional assessment methods, inventory and monitoring techniques, and creation/restoration protocols. The Wetlands Program provides extensive support to the Commonwealth's tidal wetlands and subaqueous lands management programs through review of individual tidal wetland permit applications, training for local and state managers, and development/ management of data bases supporting and tracking regulatory program activities.

Permits Reviewed 1973 - 2009

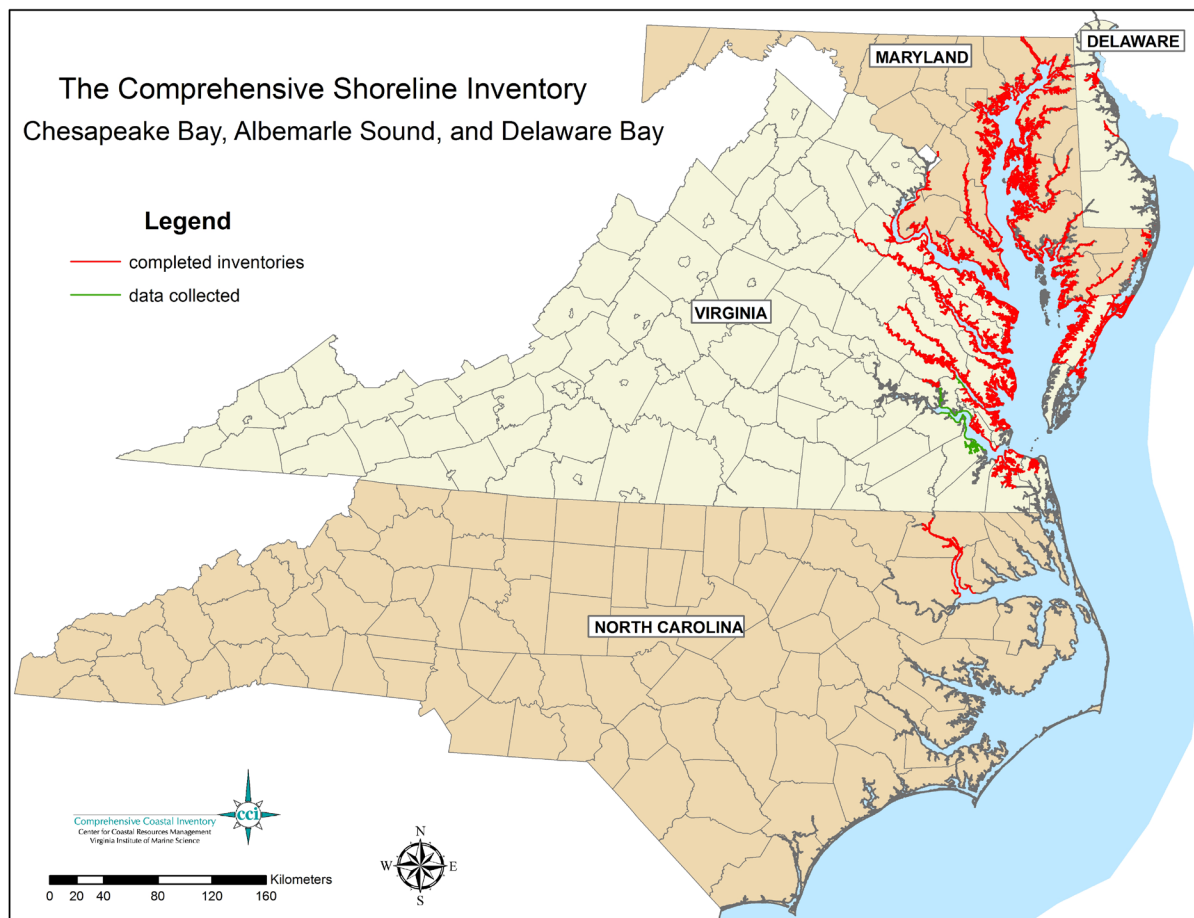


Coastal Inventory Program

Comprehensive Coastal Inventory
Center for Coastal Resources Management
Virginia Institute of Marine Science



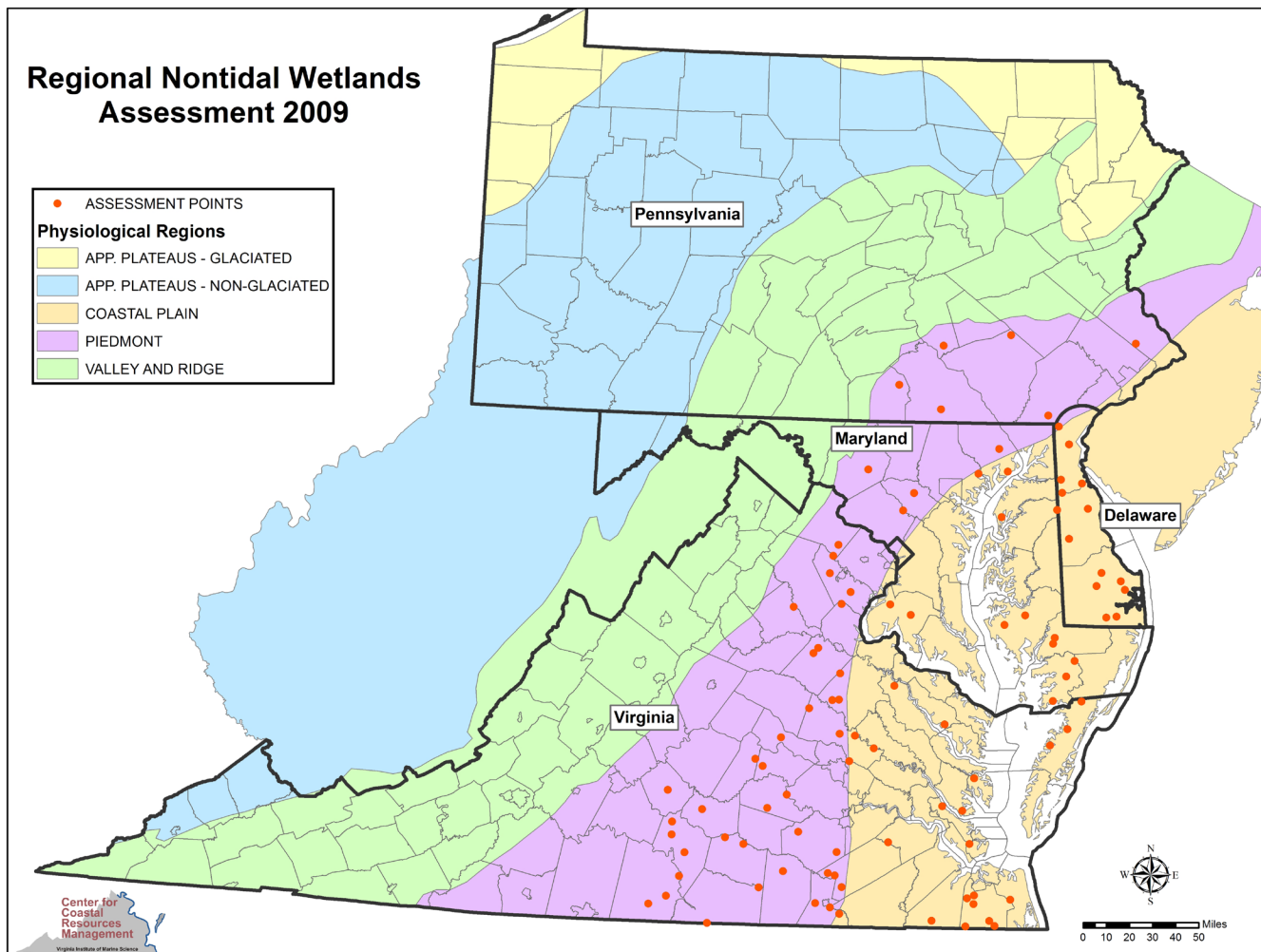
The Coastal Inventory Program has a basic mission to monitor tidal shoreline conditions and to develop policy/management recommendations based on analysis of that information. The Coastal Inventory Program has developed extensive capabilities in geographic information systems and in analysis of remotely sensed information. It has expanded its inventorying activities to include almost all terrestrial and aquatic resources within the coastal zone in support of the Center's focus on integrated and adaptive management. Development of GIS-based analytical protocols has become a major activity in the Coastal Inventory. Development of these tools has proven to be a most effective mechanism for integrating technical understanding and extensive data sets in a format that is comprehensible and informative for managers. The Coastal Inventory generates detailed shoreline condition inventories for every tidal county and city as part of its basic mission, and shares its extensive GIS data bases with state and federal agencies throughout the region.



Coastal Watersheds Program



The Coastal Watersheds Program evolved to deal with the water quality/quantity, land use, and habitat issues that were part of integrated management of coastal resources. The program focuses on basic and applied research in support of policy and regulation development. There are both regional and international elements in the Coastal Watershed Program. The program is working on development of indicators for health of aquatic ecosystems, use conflict management plans for shallow waters, anadromous fish spawning and nursery habitat studies, and climate change impact assessments. Because much of the work on use conflict analysis, shallow water management, and fishery habitat assessment is of interest in coastal systems around the world, the Center manages growing international collaborations through the Coastal Watersheds Program.

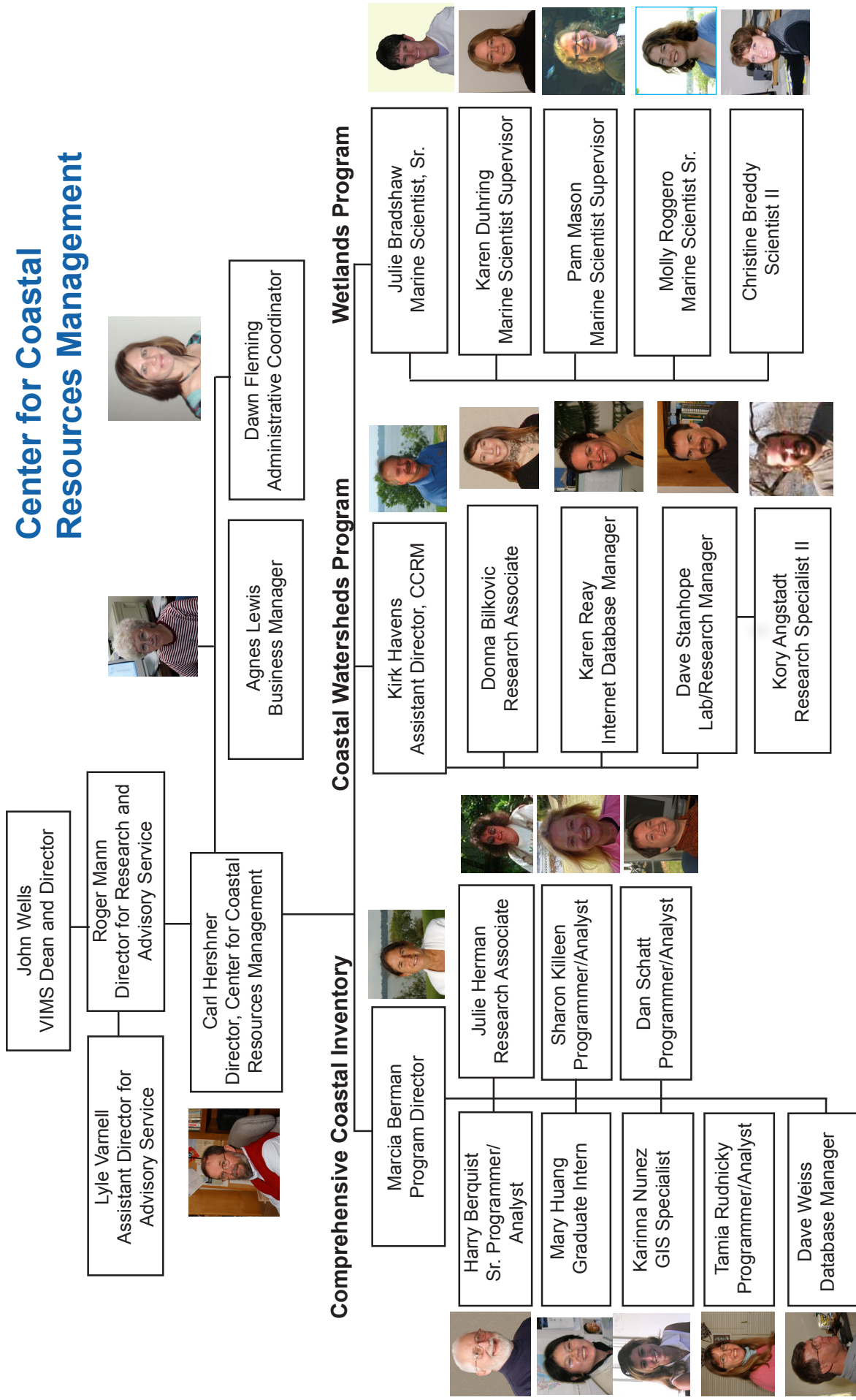


Personnel and Funding

The Center has a full time staff of about 22 individuals and supports several graduate students. The staffing varies slightly depending on grant and contract activities. Currently the Commonwealth of Virginia provides base funding for the Center that covers less than 50% of the salary expenses and about 15% of the annual operating expenses. The balance of funding is derived from grant and contract activity. The primary sources of this support have been the U.S. Environmental Protection Agency and Virginia's Coastal Resource Management Program (funding from NOAA). Other sources of recent funding have included National Oceanic and Atmospheric Administration, National Science Foundation, Virginia Department of Health, Virginia Department of Conservation and Recreation, and private donors.



Center for Coastal Resources Management



Center Fellows

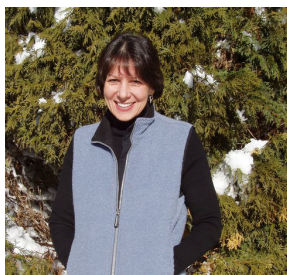
The Center Fellowship Program is designed to enhance capabilities to provide the very best research and advice by ensuring a constant influx of new ideas and perspectives. The goal is to bring dynamic young scientists into close collaboration with Center staff on a continuing basis. Each Fellow is expected to spend a minimum of one week in residence at the Center giving seminars and leading workshops in areas of their particular expertise. In addition, Fellows are engaged in development of proposals for collaborative research that may extend well beyond their formal appointments. Fellows are selected by the Center's leadership based on nominations from Center staff or colleagues at other institutions. The selection process emphasizes the goal of bringing in post-doctoral scientists who have begun careers as independent researchers, with expertise that compliments but does not duplicate Center staff expertise. Fellowship Program success is measured by the number of new research topics and approaches developed from these collaborations. These appointments started on May 1, 2004.



Dr. Anamarija Frankic is an assistant professor in the Environmental Earth and Ocean Science Department of the University of Massachusetts in Boston.



Dr. Chris Pyke is the Director of Climate Change Services for CTG Energetics, Inc.



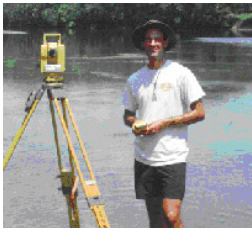
Dr. Denice Wardrop is a research faculty member in the Cooperative Wetlands Research Center at Pennsylvania State University.

Center Adjunct Research Faculty

CCRM Adjunct Research Faculty are College of William and Mary colleagues from other departments or schools. These individuals collaborate with Center staff on a continuing basis in basic and applied research. Adjunct Research Faculty expand the expertise available for CCRM projects, constituting a very efficient mechanism for addressing multidisciplinary issues. Appointments are for fixed terms and are renewable as the work of the Center and the interest of faculty members dictate. Success in the Adjunct Research Faculty program is judged by generation of collaborative proposals and research products. The first appointments to the CCRM Adjunct Research Faculty were made in December 2005.



Dr. Randy Chambers is Associate Professor of Biology and Director of the Keck Environmental Field Laboratory at The College of William and Mary.



Dr. Gregory Hancock is Associate Professor of Geology at the College of William and Mary.

Center Associate Researchers

CCRM Associate Researchers are scientists from other institutions, government agencies, and/or the private sector who collaborate with Center staff on research and advisory projects. Appointment as an Associate Researcher is based on sustained productive interaction. Appointments are for fixed terms and renewable as appropriate. The first appointments of CCRM Associate Researchers were in September 2005.

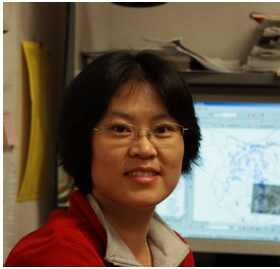


Daniel Redgate is an Environmental Scientist at Kimley-Horn and Associates, Inc.



Dr. Ed Sharp Ed is retired and currently working on developing methodologies for the use of thermal imaging in natural resource research.

Center Graduate Students



Mary Huang - Mary is a Ph.D. candidate at the Virginia Institute of Marine Science investigating the role of watershed characteristics as a source of fecal coliform by analyzing the model predicted errors between observed data and water quality model predictions. The results of this work may have an impact on the development of shellfish total maximum daily loads (TMDLs) in Virginia.

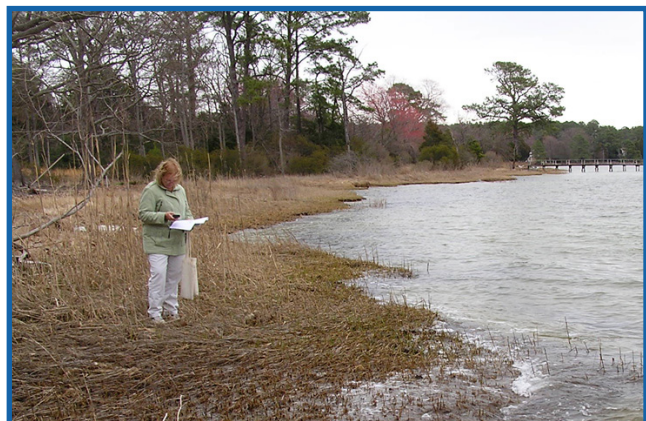


Karina Nunez - Karinna is a MS candidate in the College of William and Mary School of Marine Science. She is the final year of work on her project to develop a shoreline change forecast and wetland response model for Dorchester county, MD. The project seeks to advance current approaches to forecasting future shoreline conditions under climate change by considering both inundation and erosion under accelerating sea level rise. While pursuing her degree, Karinna also works for CCRM as a GIS Programmer/Analyst. Her research interests include GIS technology and remote sensing applications for sustainable development of coastal resources.



Center Collaborations

Albemarle Pamlico National Estuary Program
Altria Group, Inc.
Arc Economics, Inc.
Baltimore District Corp of Engineers
Chesapeake Bay National Estuarine Research Reserve
College of William and Mary
Delaware Department of Natural Resources & Environmental Control
East Carolina University
Flanders Maine Institute
Garden Club of America
Hill Studio
Longwood University
Lynnhaven River NOW
Maryland Department of the Environment
Maryland Department of Natural Resources
Mathews County
Mathews Maritime Foundation
Narragansett Bay National Estuary Program
National Fish & Wildlife Foundation
Nature Conservancy
NOAA Chesapeake Bay Program Office
NOAA Coastal Services Center
North Carolina Coastal Federation
Oregon State University
Pennsylvania State University
Smithsonian Environmental Research Center
U.S. Coast Guard Auxiliary
U.S. Dept of the Army, Night Vision & Electro-optics Div. (retired)
U.S. Environmental Protection Agency
University College Cork, Ireland
University of Maryland
University of North Carolina
University of Oregon State
University of Washington
University of Wisconsin
Virginia Coastal Zone Management Program
Virginia Department of Conservation & Recreation
Virginia Department of Environmental Quality
Virginia Department of Forestry
Virginia Marine Resources Commission
Virginia Polytechnic Institute and State University
Washington State Department of Ecology
Wetlands Watch





CENTER PROJECTS

Climate Impacts in VA: Status of Natural Resource Data Records as Tools to Assess Continuing Trends



PI: Berman, Hershner
Funding Agency: VEE
Period: 04/01/08-01/31/10
Amount: \$40,000

This project reviews existing databases that contain information which would be useful for assessing trends in natural resources which may be driven by climate change impacts. The final product is a digital bibliography of sources that span academic, private, federal, state, and local government

agencies. The report is available by clicking on Climate Change Database Report at this site:

http://ccrm.vims.edu/climate_change/index.html

Effects of Sea Level Rise on Tidal Wetlands

Principal Investigator: Berman
Funding Agency: VA Environmental Endowment
Period: 10/1/07-1/30/2009
Amount: \$31,462

This project maps the anticipated loss of tidal wetlands habitat in the Lynnhaven River watershed attributed to sea level rise. The project uses remote sensing techniques and high resolution imagery to delineate current wetlands distribution. High-resolution elevation data generated from LIDAR was used to compute the horizontal and vertical inundation due to sea level rise in 25 and 50 year intervals as well as a projection to the year 2100. Final project report is located at this site:

http://ccrm.vims.edu/gis_data_maps/static_maps/lynnhaven_project/index.html.



Living Shoreline Suitability Modeling - Calvert and Somerset Counties Maryland

Principal Investigator: Berman
Funding Agency: NOAA
Period: 10/01/08-10/01/2009
Amount: \$49,515

This project extends the Living Shoreline Suitability Model to two additional counties in Maryland. The model was run in Calvert and Somerset counties and the model output was mapped and added to the Maryland Shorelines Online project. For more details on the Living Shoreline Suitability Model see the Living Shoreline Suitability Model – Worcester County, Maryland.

<http://ccrm.vims.edu/livingshorelines/projects/index.html>

Mathews County Shoreline Management Plan

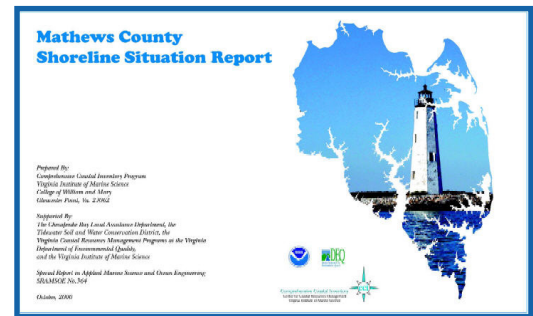
PI: Berman

Funding Agency: NFWF

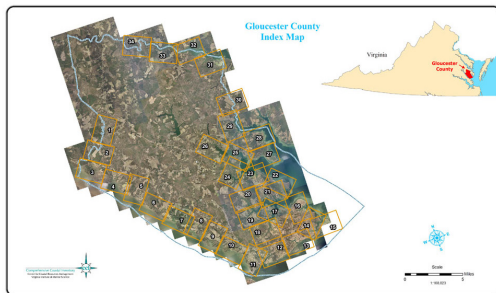
Period: 1/01/08-9/30/2009

Amount: \$56,095

This project developed a shoreline management plan for the County of Mathews, Virginia. The project includes the development of a Shoreline Inventory which report current shoreline condition (http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/virginia/mathews/mathews_disclaimer.htm), and recommendation for strategies to management shoreline erosion. The project is a collaborative effort with the County government as they prepare updates to their comprehensive plan.



Tidewater Shorelines Inventory Report: Phase 3



Principal Investigator: Berman

Funding Agency: NOAA

Period: 10/1/2008-9/30/2009

Amount: \$49,500

This project extends the development of Shoreline Inventories into two additional localities in Virginia. They are York County and the City of Newport News. Data for both areas had been previously collected in earlier years. The project addresses data processing and completes the publication phase of the inventory development. For similar products see GIS Maps & Data - Shoreline Inventories -

http://ccrm.vims.edu/gis_data_maps/shoreline_inventories/index.html

Survey of Atlantic Sturgeon Spawning Habitat on the James River

Principal Investigator: Bilkovic

**Funding Agency: US Fish and Wildlife Service,
NOAA Chesapeake Bay Program**

Period: 11/01/05 - 5/31/07 (USFWS), 10/01/07 - 4/30/09 (NOAA-CBO)

Amount: \$12,945 (USFWS), \$20,000 (NOAA-CBO)



This project's objectives are to conduct benthic habitat mapping of potential Atlantic sturgeon spawning reaches using side-scan sonar to ascertain the presence and location of essential spawning habitat (e.g. gravel beds) in the James River. Areas surveyed include the upper reaches of the James River from Shirley Plantation to Richmond. The location of viable hard bottom habitats for sturgeon spawning will be determined and geo-referenced for future evaluation with additional habitat quality information.

http://ccrm.vims.edu/research/mapping_surveying/sturgeon/index.html

Tidal Wetlands Management Technical Support

Principal Investigators: Fleming, Hershner

Funding Agency: VA Coastal Zone Management Program / NOAA

Period: annually 10/1-9/30

Amount: \$42,000

This project has been a continuing grant renewed annually to support advisory service provided by the Wetlands Program to the Tidal Wetlands Management program. In particular, this grant helps fund travel costs associated with site visits and meeting attendance by staff scientists, publication costs for wetlands newsletters and outreach education materials, as well as some of the expenses of maintaining the tidal wetlands permit database on the Center's website.

<http://www.vims.edu/ccrm/wetlands/newpermits.html>

Funding was provided to support production of the following publications:

Rivers and Coast, Winter 2009, Vol. 4, No. 1. Ecosystem Services of Tidal Shorelines

<http://ccrm.vims.edu/publications/pubs/rivers&coast/Jan09rivers&coastfinal.pdf>

Rivers and Coast, Fall 2009, Vol. 4, No. 2. Evolving Guidance for Tidal Wetlands Management

http://ccrm.vims.edu/publications/pubs/rivers&coast/vol4_no2_evolving_guidance.pdf



Virginia Wetlands Report, Spring 2009, Vol. 24, Issue 1. VIMS Advisory Support: Updates for 2009

http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2009_Spring.pdf

Virginia Wetlands Report, Fall 2009, Vol. 24, Issue 2. Shallow Water Habitat and Dredging

http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2009_fall.pdf

Living Shoreline Design and Construction Manual

Principal Investigators: Hardaway, Milligan, Duhring

Funding Agency: NOAA

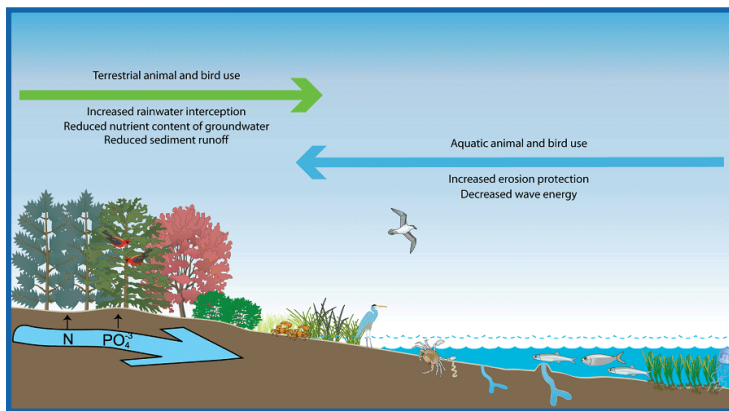
Period: 10/01/08 – 03/01/10

Amount: \$10,079



This project will develop a manual that will provide design and construction guidance for contractors, coastal managers, planners, local governments, homeowners and those interested in sound shoreline management. The manual will incorporate graphics and guidelines produced for an on-line course completed in 2008. The manual will also serve as curriculum for a marine contractors training course being planned for the fall of 2010. Integrated shoreline management across jurisdictional habitats and maximizing ecosystem services of vegetated coastal habitats are the guiding principles for the manual.

Developing a Curriculum for a Living Shorelines Education Course for Project Designers and Contractors



Principal Investigators: Havens, Roggero, Bradshaw

Funding Agency: Chesapeake Bay Restoration Fund

Period: 7/01/07 - 4/01/09

Amount: \$14,000

This project involves designing curriculum for a course to educate shoreline project designers and contractors about the use of "Living shoreline" designs. The course

stresses the reasoning behind the recommended design criteria, so that participants learn why the designs function naturally, not just how to build them. The course also stresses interactions between the upland riparian zone, the wetlands and the aquatic system - three areas that are functionally integrated and tend to be impacted by shoreline projects.

http://ccrm.vims.edu/education/living_shoreline_design_class/index.html

Guidebook Hydrogeomorphic Wetlands Assessment

Principal Investigator: Havens

Funding Agency: EPA/HGM

Period: 10/01/08 – 9/30/09

Amount: \$77,747

The objective of this project is to develop a finalized HGM guidebook for coastal plain flats in the Mid-Atlantic. The Mid-Atlantic flats guidebook will provide guidance in determining functions associated with flats for use in the regional regulatory programs. The project task

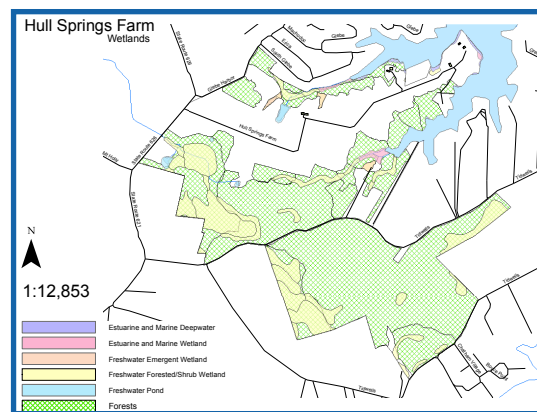
is to combine HGM guidance developed in Delaware and Virginia into a guidebook for the Mid-Atlantic. The final product is a Regional HGM Guidebook for Coastal Plain Flats.

Longwood College / Hull Springs Farm Wetlands Project

Principal Investigators: Havens, Redgate
Funding Agency: private funds, in-house

Hull Springs Farm is owned by Longwood University Foundation, Inc. The Foundation works closely with the faculty of Longwood University and other universities and groups to coordinate all uses of Hull Springs Farm for educational events and research. Scientists from the Virginia Institute of Marine Science (of the College of William and Mary) have been researching the Farm's hydrology, soil, and biological indicators (for example, plants) to determine areas of the farm that could be restored to wetlands.

<http://www.longwood.edu/hullspringsfarm/>



Nontidal Wetland Inventory and Monitoring Strategy for Virginia



Principal Investigators: Havens, Hershner
Funding Agency: EPA/DEQ
Period: 02/08/08 - 12/15/09
Amount: \$164,565

The project continued to develop a complete wetland monitoring and quality assessment in Virginia's Coastal Plain, Piedmont, Valley and Ridge, Blue Ridge, and Appalachian Plateau physiographic provinces, building on existing work to develop a monitoring and assessment strategy for Virginia. A total of 2,126 Level II calibration sites were visited in

the Commonwealth of Virginia (Coastal Plain = 1,326, Piedmont = 602, and Ridge & Valley, Blue Ridge, Appalachian Plateau = 198).

Estuarine Suspended Sediment Loads and Sediment Budgets in Tributaries of Chesapeake Bay

Principal Investigator: Herman
Funding Agency: Army Corps of Engineers
Period: 10/01/08 - 09/30/09
Amount: \$48,868
Period: 5/01/09 - 09/30/09
Amount: \$29,989



The goals of this project are to calculate sediment transport processes, suspended sediment loads and sediment budgets for the estuarine portions of major tributaries of Chesapeake Bay in Virginia and Maryland. The initial phase will target the York River, VA and the Patuxent River, MD. The second phase calculates sediment loads and several components of the sediment budget for the Potomac River, MD.

A more detailed description of the project is available at:

http://ccrm.vims.edu/research/water_sediments/suspended_sediments/index.html

Vulnerability of Shallow Tidal Water Habitats in Virginia to Climate Change

Principal Investigators: Bilkovic, Hershner, Berman

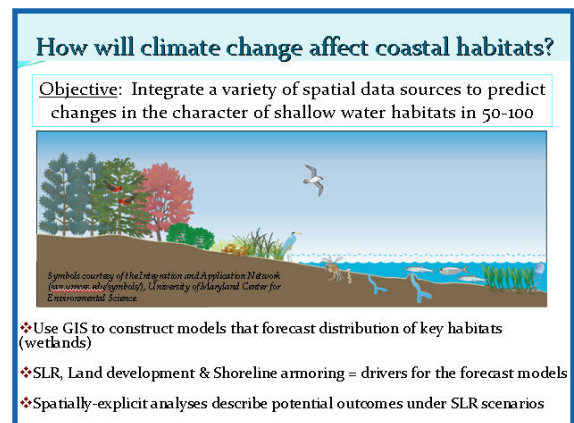
Funding Agency: NOAA Chesapeake Bay Program

Period: 10/01/07-11/30/09

Amount: \$120,000

Shallow water environments are vital to the coastal community, providing an enormous mix of ecological services. The principal objective of this study was to develop a characterization of current shallow-water habitat components in Virginia tidal waters and predict climate driven changes to these habitats. Geospatial models were constructed that forecast the future distribution of key coastal habitats (i.e. anticipated relative sea level rise, temperature and salinity projections, and coastal development. Project results can be used to inform forward-looking management efforts to identify and protect areas where habitat complexes are most likely to be sustainable, as well as preserve opportunities for migration of habitat elements in an evolving system.

http://ccrm.vims.edu/research/climate_change/index.html



Garden Club of America Scholarship

Principal Investigators: Hershner, Reay, Bradshaw

Funding Agency: Garden Club of America

Period: annual (2000 to present)

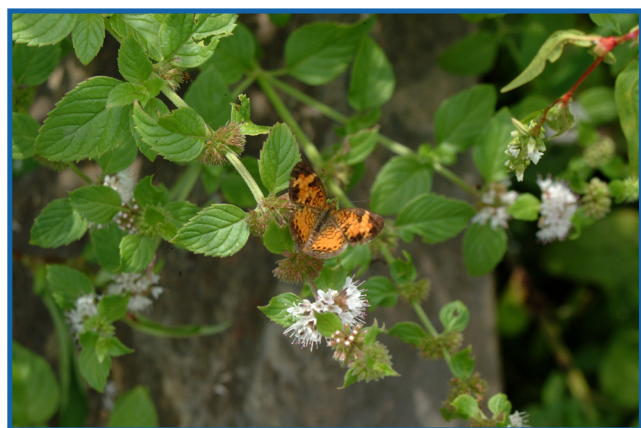
Amount: \$500

The Center manages the annual advertisement, review, and selection of recipients for the Garden Club of America Scholarship for Wetland Studies. Each year the Center advertises and responds to inquiries regarding the award. In February it receives, reviews, and ranks applicants and makes a recommendation to the GCA for that year's awards. Awards are open to any graduate student undertaking a field-oriented study of wetlands at an American university.



Website: http://ccrm.vims.edu/education/garden_club/index.html

Marine Science Teaching Marsh



Principal Investigators: Hershner, Reay

Funding Agency: Dreyfus Foundation

Period: Private Funds 12/2009

Amount: \$30,000

Improvements were made to the VIMS Teaching Marsh via updated signage and informational kiosks, updated video cameras, and modifications to the educational website. Teaching Marsh web page improvements include an interactive map to provide users

with the ability to rollover and click on various portions of the marsh to view detailed habitat descriptions. The website informs users of various wetland plant species found within the Teaching Marsh via a printable salt and brackish marsh field guide, as well as descriptions of general wetlands properties, benefits, and functions. An interactive learning activity game called Natural Treasures, allows children the opportunity to test their wetlands knowledge by clicking on multiple choice answers.

http://ccrm.vims.edu/wetlands/teaching_marsh/index.html

Mid-Atlantic Multi-Level Non-Tidal Wetlands Assessment

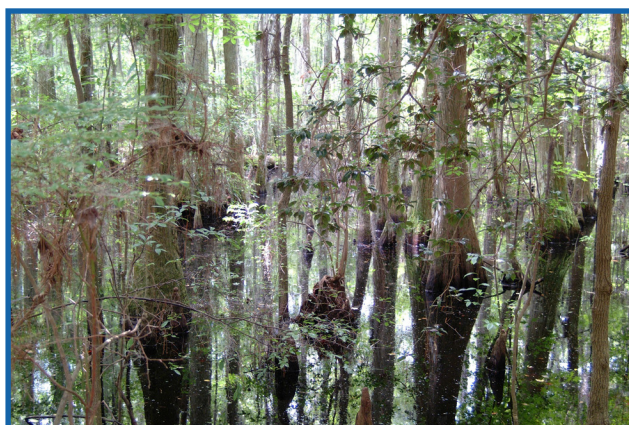
Principal Investigators: Havens, Hershner

Funding Agency: EPA

Period: 10/01/07 - 09/30/12

Amount: \$460,000

This project implements a level 1 GIS-based protocol for assessment of nontidal wetlands and their functions in the Mid-Atlantic states of Pennsylvania, Delaware, West Virginia, and the



District of Columbia. CCRM and Pennsylvania State University's Cooperative Wetlands Center are collaborating to develop and implement a wetlands assessment protocol for the Mid-Atlantic region. The protocol will synthesize methods currently developed for Pennsylvania, Virginia, Delaware, Ohio and other comparable programs. This project will generate a protocol that can be used for probabilistic sampling and characterization of wetlands in each of the major ecoregions of the Mid-Atlantic.

Wetlands Permit Review and Report Generator

Principal Investigators: Hershner, Berman, Fleming

Funding Agency: in-house

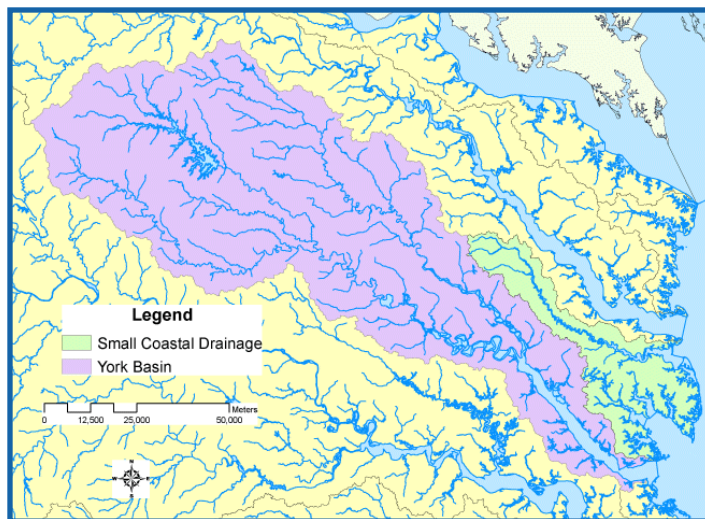
Period: 1/30/10

This project enhances the permit reporting process to increase the amount of information presented while automating systematic reporting. This is the first system of its kind that combines expert staff review with landscape information retrieved from spatial databases. The report generator is always being modified as new landscape information is available. The reports along with the original application and related photos are posted online in a searchable database.

http://ccrm.vims.edu/resources/YR_waterbudget/index.html

VIMS Shoreline Permit Application Report # 10-0796	
APPLICANT:	CLAUDE B. ALLEN, JR.
Locality:	ESSEX COUNTY
Immediate Waterway:	Rappahannock River
Report Date:	5/21/10
EXISTING SITE CONDITIONS AND PROPOSED ACTION:	
<p>The applicant proposes construction of a 50 LF bulkhead (groin/jetty structure) adjacent to an existing boat ramp access drive to protect the existing ramp and access way, and to repair a 4 foot, a 16 foot and a 5 foot section of existing bulkhead in place along its sandy, high-energy shoreline of the Rappahannock River.</p> <p>THE PREFERRED APPROACH FROM AN INTEGRATED MARINE ENVIRONMENTAL VIEWPOINT:</p> <p>The majority of the proposed bulkhead (groin/jetty) structure appears to be proposed in uplands, however proper best management practices should be used during construction to prevent material from entering the waterway and adjacent wetlands.</p> <p>The impacts from the proposed groin/jetty structure would be expected to be minor however, riprap may be considered along the beach section to reduce the resultant reflective wave energy generated by a groin/jetty structure. Even though a rock structure would have a larger footprint, riprap dissipates, rather than reflects wave energy as bulkheads do, and provides more habitat value than bulkheads. In addition, when properly designed and constructed, riprap structures generally last much longer than bulkheads.</p> <p>From a marine environmental viewpoint, bulkheads are not appropriate shoreline treatment, especially on high energy shorelines. The proposed replacement bulkhead sections would continue to sever the connection between the upland, shoreline, and deeper water areas, and destroy habitat. Bulkheads change how waves strike the shoreline and typically contribute to their own destruction by reflecting waves and eroding the shoreline on the water side of the structure.</p> <p>Removing the failing bulkhead and constructing a properly sized revetment with the toe aligned landward of beach and wetland impacts is preferred for this shoreline from a marine environmental viewpoint.</p> <p>Planting a variety of deep-rooted shrubs and grasses in the riparian area (yard) and stopping the routine mowing to the shoreline edge are also recommended to enhance the buffer area and provide erosion and water quality benefits.</p>	
RECOMMENDATION(S) SUMMARY:	
<p>Center for Coastal Resource Management P.O. Box 1346 Gloucester Point, VA 23062-1346 (804)684-7792, fax (804)684-7179, http://ccrm.vims.edu/</p> <p>WILLIAM & MARY VIMS The College of William & Mary P.O. Box 2000 Williamsburg, VA 23186-2000 (804)690-1234, fax (804)690-1235, http://vims.wm.edu/</p>	

York River Watershed Planning



Principal Investigator: Hershner,

Roggero

Funding Agency: Phillip Morris

Period: 02/01/08 - 06/01/09

Amount: \$45,348

This project involved assessment of available information to develop guidance for establishing minimum instream flow requirements in the tidal freshwater portions of the York River system. Existing MIF methods were reviewed and aquatic habitat requirements were synthesized. Recommendations for both interim management strategies and future

development of guidance were generated, along with outreach materials for watershed localities.

http://ccrm.vims.edu/resources/YR_waterbudget/index.html

Integrated Guidance Project

Principal Investigators: Mason, and staff

Funding Agency: in-house

Period: ongoing



Virginia is battling to change the current trend toward environmental degradation. The effects of direct, secondary and cumulative impacts have had significant adverse impacts on water quality, habitat and aquatic resources. It has become increasingly apparent that in order to reduce the cumulative and secondary impacts of activities within the multiple jurisdictions and multiple management programs affecting the littoral and riparian zones, better coordination and integration of policies and practices is necessary. The concept of integrated coastal management embodied by

sustainability, adaptability and effective coordination provides a framework to address the current problems inherent in coastal management generally, and shoreline management specifically. There are currently a variety of local and state programs managing shoreline development activities. Each of these programs have their own set of regulatory and guidance documentation. And each managed resource, or jurisdictional area, offers various ecosystem services that are valued by society. These services include water quality maintenance and improvement, terrestrial and aquatic wildlife habitat and recreational amenities to name a few. What is lacking is comprehensive guidance from an ecosystem perspective to promote an integrated management approach for the many regulatory programs that have some responsibility for coastal, shoreline resources. This project involves the development of comprehensive guidance for shoreline management based on ecosystem services. Various combinations of riparian and littoral condition will be modeled for two services; habitat and water quality. The impacts of various shoreline development practices will be assessed based upon those services, and environmental preferences that minimize adverse impacts and/or maximize beneficial outcomes will be identified.

Link to more information - http://ccrm.vims.edu/permits_web/guidance/index.html

Recommendations for Revision of the Dunes/ Beaches Guidelines

Principal Investigators: Mason,

Bradshaw, Duhring, Hardaway, Varnell

**Funding Agency: VA Coastal Zone
Management Program / NOAA**

Period: 10/01/07 – 09/30/09

Amount: \$50,000



There are currently a variety of regulations and guidelines developed by local and state programs managing shoreline development activities. Development of proposed revisions to the Dunes/ Beaches Guidelines document is part of CCRMs on-going integrated guidance initiative. The Dunes/Beaches Guidelines will be based upon the current scientific understanding of the ecology of beaches and dunes and their role in the landscape.

http://ccrm.vims.edu/publications/pubs/rivers&coast/Sp_Issue_rivers&coast10_09.pdf

Initial Development of a Web-Based Reporting Capacity for Virginia's Chesapeake Bay and Virginia Waters Clean-Up Plan

Principal Investigators: Hershner, Mason

Funding Agency: NOAA

Period: 10/01/09 – 9/30/12

Amount \$ 50,000

This project involves the initial development of a web-based reporting capacity for Virginia's Chesapeake Bay and Virginia Waters Clean-up Plan reports. The intent will be to enable the public to access information on the condition of Virginia waters along with the status of clean-up efforts. The web site will also provide links to background information and related materials that can enhance public understanding of the Bay and its watershed, as well as the actions necessary to improve its condition.



Strengthening Virginia's Wetlands Management Programs

Principal Investigators: Hershner, Berman, Havens

Funding Agency: EPA

Period: 10/01/09 – 9/30/11

Amount \$394,700

This project involves two activities. The first is initial development of comprehensive wetland management plans for localities. The plans

specifically address the threat of climate driven impacts to tidal wetlands. The beginning work will be undertaken in the York River system. The second task begins effective linkage of the Commonwealth's wetland management programs with the Commonwealth's water quality management program. Under this project we are: providing wetland assessment training to water quality monitoring personnel, conducting advanced assessment of sites of interest to the water quality program; and synthesizing results from both the wetlands and water quality monitoring programs to facilitate collaborative use of the information.

Virginia Coastal Energy Research Consortium

Principal Investigators: Hershner, Herman

Funding Agency: Old Dominion University Research Foundation

Period: 7/1/08 – 6/30/09

Amount: \$31,250

CCRM contributed to the Virginia Coastal Energy Research Consortium through collaboration with James Madison University researchers developing baseline spatial data for offshore areas. Under this project we assisted in collecting and formatting data for a comprehensive GIS data base and, working with VIMS Physical Sciences modeling group, developed simulation capabilities for wind generated waves in Virginia waters.

Estuarine Blue Infrastructure: Priority Conservation Areas for the Virginia Portion of the Chesapeake Bay and the Seaside of the Eastern Shore



Principal Investigator: Berman

Funding Agency: NOAA

Period: 9/01/09 – 3/31/10

Amount: \$78,350

Using GIS, aquatic resources will be mapped to identify areas of ecological richness within Virginia's estuaries and bays. The project will collect and disseminate resource information from a variety of agencies, map their distribution and collectively assess areas supporting a large number of aquatic habitat or species. Linkages between these areas and areas defined as high

priority conservation areas on the upland will be generated to determine potential aquatic zones for conservation or preservation. The project contributes to Virginia's ongoing efforts to identify and prioritize conservation opportunities within the watershed.

Living Shorelines Website for Property Owners, Industry and Managers

Principal Investigator: Mason

Funding Agency: NOAA/DEQ

Period: 10/01/09 – 9/30/10

Amount: \$ 44,090

The Center for Coastal Resources Management, VIMS, has undertaken an initiative to provide integrated scientific guidance for better-informed decision-making regarding Virginia's shoreline systems. A critical component of the initiative is the promotion of shoreline



management approaches that are sustainable. Commonly called living shorelines, these are approaches that make the best use of natural features to protect property while preserving or enhancing ecosystem services. CCRM is already serving living shorelines information on our website. However, the existing website is a bit dated and some of the information is “hidden” in documents and not easily accessible. We propose to create a new living shorelines website to address the information needs of the various users involved in

shoreline management. The changes to the website will reflect input from various user groups including residential property owners, industry, and regulators and decision-makers. The website content will be updated based upon a review of the current scientific literature.

Design and Construction of Living Shorelines: Course Development and Implementation

Principle Investigators: Hardaway, Milligan, Duhring

Funding Agency: NOAA/DEQ

Period: 10/01/09 - 9/30/10

Amount: \$12,869

The goal of this project is the development of a class that will provide practical design and construction guidance for contractors, coastal managers, planners and others interested in sound management of Chesapeake Bay’s shorelines. The curriculum to be developed will include site-specific case studies and design lessons with both classroom and field sessions.

Derelict Blue Crab Trap Removal

Principal Investigator: Havens, Bilkovic

Funding Agency: NOAA/VMRC

Period: 12/1/08 – 11/30/11

Amount: \$1,064,600

Discarded debris such as tires, gill nets, appliances, and crab pots can be found throughout the tidal waters of Virginia. Derelict crab pots may remain in the environment for years and continue to capture and kill fish, shellfish, birds and marine mammals including endangered or threatened species. It is estimated that around 20% of crab pots deployed are lost each season and each functional lost crab pot can continue to capture about a bushel of market-sized crabs per season. There is an environmental benefit in removing marine debris from Virginia’s waters if the removal can be accomplished safely and without damaging the marine habitat and ecosystem. This project includes work specifically



aimed at removing marine debris from Virginia's tidal waters with the assistance of watermen. Watermen who would have been eligible to participate in the 2008/2009 crab dredge season (this season was closed by VMRC in April 2008) were invited to participate in the program. Eight additional watermen were added to the program to allow for surveying in shallow water areas. A total of sixty six participants will survey the Virginia portion of the Chesapeake Bay. The participants will record the bay-catch associated with the over derelict crab pots that are removed. For detailed information, including specific maps showing the location of all removed items to date visit

http://ccrm.vims.edu/marine_debris_removal/



State of the Chowan and Pasquotank River Basins: Development of Report Card and Data Atlas

Principal Investigators: Havens, Mason

Funding Agency: APNEP

Period: 11/14/08 – 08/01/09

Amount: \$25,000

The Albemarle-Pamlico National Estuary Program is embarking on an ambitious project to assess the state of the APNEP ecosystem using indices of environmental quality. This project, focusing on just the Chowan and Pasquotank basin, will serve as a launching pad for a broader assessment in the future, essentially serving as a pilot assessment. The report cards generated will provide APNEP with a means of communicating environmental quality to the public and the indicators generated will help further hone APNEP's monitoring program.

Reducing Derelict Crab Pots

Principal Investigators: Havens

Funding Agency: SG

Amount: \$4,150

This project involves the real-world testing of the panels by incorporating them into the regular potting operation from March through October. Two commercial watermen will each include 10 modified pots as part of their commercial crabbing operation in the York River, Virginia. The watermen will be provided with data sheets and will record catch data on each set of ten pots and ten randomly chosen regular pots. The data will be analyzed to determine if differences in catch rates for market size crabs and undersized crabs and fish exist between experimental and control pots. Durability of the degradable panels will also be assessed. Staff from the Virginia Institute of Marine Science will construct the degradable panels and analyze the data.



Reducing Impact of Lost Crab Traps on Fishery Resources

Principal Investigators: Havens

Funding Agency: NFWF

Period: 10/01/09 – 12/31/10

Amount: \$32,300



This project involves the real-world testing of the panels by incorporating them into the regular recreational and commercial blue crab fishing operations during the blue crab season from April - October. At least ten residents who regularly deploy blue crab traps from their private piers will be recruited from a waterfront community to test traps modified with degradable panels against unmodified control traps. Each participant will be asked to check their traps at least once per week and note the species trapped and count, sex, and measure (carapace width) the crabs trapped. The entire waterfront community will be surveyed to determine whether they would be willing to pay extra for a trap that is deemed 'green' and promotes a sustainable fishery concept. Five commercial crabbers from various regions of the Virginia portion of the Chesapeake Bay will incorporate 5 modified traps as part of their normal operation. The five modified traps and five control traps will be checked daily for one week in the spring, summer, and fall season. The crabs trapped will be identified, counted, and measured.

CBNERR Website Redesign

Principal Investigator: Reay

Funding Agency: NOAA

Period: 9/1/09 – 12/30/09

Amount: \$2,709.00

The Center for Coastal Resources Management webmaster worked with personnel from the Chesapeake National Estuarine Research Reserve in Virginia (CBNERR) to redesign and update their website. The redesign was integrated into the VIMS Hannon-Hill Cascade content management system (CMS) providing a seamless interface with the VIMS webpage and an easier update capability for CBNERR personnel. A reorganized navigation system, along with modified content, photos, documents, and an event list linked to the main VIMS site through the CMS, made the site useful and provides timely information for public workshops and training. The CBNERR site is identifiable from the main VIMS site by a unique masthead logo, as well as CBNERR-specific masthead photos. <http://www.vims.edu/cbnerr/>



A photograph showing several blue crabs with orange claws and legs, partially obscured by a dense network of brown mangrove roots. The crabs are situated on a dark, wet, reddish-brown surface, likely a mangrove floor. The image is positioned on the left side of the page, taking up about half the width.

Advisory Activities



2009 Advisory Activity

CCRM staff participates regularly in a broad range of advisory activities- that is providing a vice to individuals and groups of private citizens, resource managers, and decision-makers. Our advisory activities include responding to phone call and email requests for information; field visit consultations; membership and participation on local, state and regional workgroups and committees; written advice on tidal shoreline projects through the joint permit application process; the publication of newsletters and special reports; giving talks; as well as providing training and special topics workshops.

	Information Requests	Field Consults	Meetings	JPA Advisory Reports	Permit Website Hits
January	171	0	16	69	397
February	197	1	16	32	259
March	203	2	23	50	227
April	292	7	29	27	242
May	206	1	20	35	194
June	181	5	14	54	230
July	173	1	16	47	203
August	243	0	10	31	172
September	171	5	20	45	237
October	178	3	17	47	257
November	149	5	8	34	236
December	122	1	12	31	275
Total	2286	31	201	502	2929

Advisory Committees

CCRM Staff provided service on the following advisory committees:

Albemarle Pamlico National Estuary Program Policy Committee

Albemarle Pamlico National Estuary Program North Carolina Comprehensive Conservation and Management Plan Steering Committee

Albemarle Pamlico National Estuary Program Scientific and Technical Advisory Committee (STAC)

Albemarle Pamlico Scientific and Technical Advisory Committee (STAC) Executive Committee

Chesapeake Bay National Estuarine Research Reserve (CBNERR) Coastal Training Program Advisory Board

Chesapeake Bay Local Assistance Division (CBLAD) Technical Advisory Committee

Chesapeake Bay Program (CBP) Scientific and Technical Advisory Committee

Chesapeake Bay Program (CBP) Sediment Workgroup

Chesapeake Bay Program (CBP) Wetlands Assessment Team

Department of Environmental Quality (DEQ) Academic Advisory Committee

Department of Environmental Quality (DEQ) Virginia Coastal Policy Team

Mid-Atlantic Wetlands Workgroup

Middle Peninsula Planning District Commission (PDC) Climate Change Adaptation Steering Committee

US Army Corps of Engineers (COE) Lynnhaven River Restoration Study Steering Committee

US Coast Guard Area Contingency Planning Committee

Virginia Geographic Information Network (VGIN) State GIS User Group

Virginia Marine Resources Commission (VMRC) Habitat Management Advisory Committee

Virginia Stream Alliance

Virginia TMDL Advisory Committee

Virginia Waters Advisory Committee

York River Watershed Roundtable

Outreach Education Classes

Regional Integrated Shoreline Management Workshops

Website: http://ccrm.vims.edu/publications/publications_topics/vwr/vwr_2008_spring.pdf

Wetlands Program staff continued a series of regional workshops providing an introduction to the practical application of integrated shoreline management. Topics included discussion of ecosystem services, determination of erosion risk and indicators, determination of preferred shoreline treatments and their impacts, as well as basic training in jurisdiction determination, tidal wetland delineation, pre-application strategies, and permit processing and evaluation. The half-day workshops targeted Wetlands Board and Chesapeake Bay Board staff, and were coordinated through the Planning District Commissions and Regional Commissions in an effort to assist them in accomplishing this portion of their jobs.

- January 13 Crater PDC
- January 22 Richmond Regional PDC
- January 28 George Washington Regional Commission
- January 29 Hampton Roads PDC – Southside
- January 29 Hampton Roads PDC – Peninsula
- February 24 Northern Virginia Regional Commission

This training was also extended to Wetlands Board members on request:

- August 17 Westmoreland County Wetlands Board
- October 7 City of Portsmouth Wetlands Board
- December 8 Prince William County Wetlands Board

Tidal Wetlands Workshops:

The Center provides an tidal wetlands educational workshopsoportunity twice a year for local government staff, advisory board members, marine contractors, permitting agents, environmental consultants, and anyone else interested in coastal resources in the Commonwealth. Speakers include VIMS scientists and state regulatory staff. The sessions provide information that is useful both in understanding shorelines and in making decisions regarding these important and dynamic resources.

Shifting Sands: Beach & Dune Management in Virginia

February 12, 2009

113 Attendees

- The History of Beach and Dune Management in Virginia – Lyle Varnell, VIMS
- VIMS Beach & Dune Research – Scott Hardaway, VIMS
- Beach Management Activities: Common Practices and Preferred Actions
- Norfolk's Experience with Beach and Dune Management – Lee Rosenberg, City of Norfolk

- Guidelines for Determining Jurisdiction
- Regulatory Issues and Procedures – Randy Owen, VMRC

http://ccrm.vims.edu/education/seminarpresentations/spring_2009/index.html

Current Issues in Coastal Resources

September 17, 2009

70 Attendees

- Marine Debris: Derelict Crab Pots and VIMS Research
- Shallow Water Habitat and Dredging: Resources and VIMS Research
- Living Shorelines Projects and Design Guidelines: Updates
- Estimating Impacts of Shoreline Projects: Talk & Field Sessions

<http://ccrm.vims.edu/education/seminarpresentations/fall2009/index.html>

Tours and Talks:

In addition to the workshops, CCRM personnel gave approximately 40 talks to nearly 2200 participants on topics related to integrated shoreline management, sea level rise, shallow water dredging, marshes and buffers, living shorelines & landscapes, water quality, marine debris, land use, wetland ecosystems, aquaculture and the Chesapeake Bay. These numbers include tours through the VIMS Teaching Marsh and public seminars and technical support for the Virginia Master Gardeners and Master Naturalists programs.



CCRM Website Report

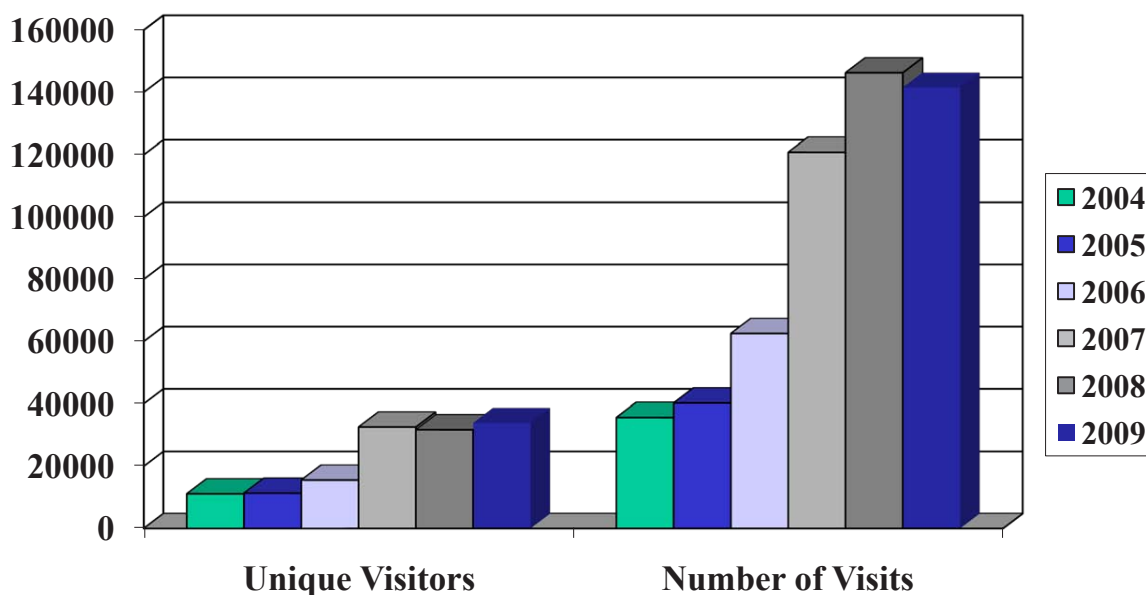
ccrm.vims.edu

In 2009, the CCRM Web usage program reports 33,954 unique visitors accessed the site with 141,549 total visits. Visitors came from 48,083 distinct Internet addresses. A typical visitor examined 11.78 distinct files before leaving the site and a typical visit lasted for 11.62 minutes.

Compared with 2008, there were 2,215 more unique visitors in 2009, but a decrease of 4,727 total visits to the system. In 2009, there was an increase of .62 minutes of average visit time.

The top CCRM website entry pages included the CCRM Index Page, Teaching Marsh, Shoreline Wetlands Seminar Presentations, Wetland Permits, and CARA Climate Change.

Chart 1: CCRM Web Usage Comparison Years 2004 - 2009





Publications

Center Publications

Rivers & Coast:

Rivers and Coast, Winter 2009, Vol. 4, No. 1. Ecosystem Services of Tidal Shorelines

<http://ccrm.vims.edu/publications/pubs/rivers&coast/Jan09rivers&coastfinal.pdf>

Rivers and Coast, Fall 2009, Vol. 4, No. 2. Evolving Guidance for Tidal Wetlands Management

http://ccrm.vims.edu/publications/pubs/rivers&coast/vol4_no2_evolving_guidance.pdf

Virginia Wetlands Report:

Virginia Wetlands Report, Spring 2009, Vol. 24, Issue 1. VIMS Advisory Support: Updates for 2009

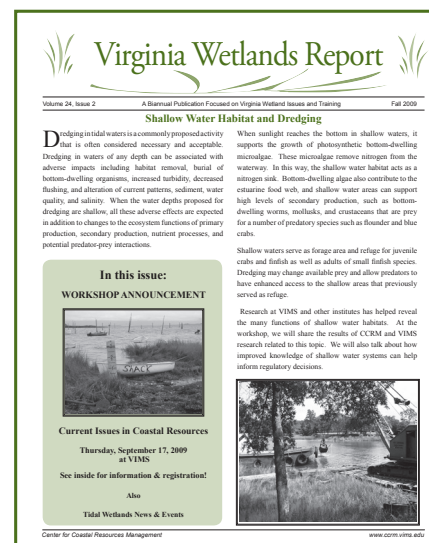
http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2009_Spring.pdf

Virginia Wetlands Report, Fall 2009, Vol. 24, Issue 2. Shallow Water Habitat and Dredging

http://ccrm.vims.edu/publications/publications_topics/vwr/VWR_2009_fall.pdf

E-News:

- CCRM e-News, July 2009. (determining benchmarks & workshop announcement)
- CCRM e-News, Aug 2009. (wetlands self-taught educational units & workshop deadline reminder)
- CCRM e-News, Oct 2009. (wetlands board decisions & workshop presentations)
- CCRM e-News, Dec 2009. (climate change & sea level rise planning maps)



Peer Reviewed Publications

Bilkovic, D. and M. Roggero. 2008. Effects of Coastal Development on Nearshore Estuarine Nekton Communities. *Marine Ecology Progress Series* 358:27-39.

http://ccrm.vims.edu/publications/pubs/BilkovicRoggero_MEPS2008-m358p027.pdf

Havens, K., D. Bilkovic, D. Stanhope, K. Angstadt and C. Hershner. 2008. The Effects of Derelict Blue Crab Traps on Marine Organisms in the Lower York River, Virginia. *North American Journal of Fisheries Management* 28(4):1194-1200.

<http://ccrm.vims.edu/publications/pubs/Havens%20et%20al%20NAJFM08.pdf>

Olney, J., D. Bilkovic, C. Hershner, L. Varnell, H. Wang, and R. Mann. 2008. Six Fish and 600,000 Thirsty Folks – A Fishing Moratorium on American Shad Thwarts a Controversial Municipal Reservoir Project in Virginia, USA. In Nielsen, J., J. Dodson, K. Friedland, T. Hamon, N. Hughes, J. Musick, and E. Verspoor, editors. *Proceedings of the Fourth World Fisheries Congress: Reconciling Fisheries with Conservation*. American Fisheries Society, Symposium 49, Bethesda, Maryland. 1,946 pages/2 volumes.

http://ccrm.vims.edu/publications/pubs/Olney_et_al_KWR_fisheries_congress2006.pdf

<http://ccrm.vims.edu/publicationd/pubs/six fish & 6000,000.pdf>

Shen, J. and J. Herman. 2008. Using a Linked Receiving Water and Watershed Modeling System to Support Management of Bacterial Sources for Poquoson River Basin in the Chesapeake Bay. *Bioinformatics and Biomedical Engineering*, 2008. ICBBE 2008. The 2nd International Conference on. pp. 3621-3624. doi: 10.1109/ICBBE.2008.407.

Shen, J., T. Wang, J. Herman, P. Mason, and G. Arnold. 2008. Hypoxia in a Coastal Embayment of the Chesapeake Bay: A Model Diagnostic Study of Oxygen Dynamics. *Estuaries and Coasts* 31(4):652-663.

<http://www.springerlink.com/content/a6q66027j005n808/fulltext.pdf>

Varnell, L., D. Evans, D. Bilkovic, and J. Olney. 2008. Estuarine Surface Water Allocation: A Case Study on the Interactive Role of Science in Support of Management. *Environmental Science and Policy* 11(7):602-612.

Hershner, C., K. J. Havens. 2008. Managing invasive aquatic plants in a changing system: strategic consideration of ecosystem services. *conservation Biology* 22:544-550.

<http://ccrm.vims.edu/publications/pubs.invasive aquatic plants.pdf>

Chambers, R, K. Havens, T. Russell, S. Killeen, and M. Berman. 2008. Common Reed *Phragmites australis* Distribution in the Chesapeake Bay Watershed. Wetlands.

<http://www.bioone.org/doi/pdf/10.1672/07-61.1?cookieSet=1>

Hershner, C., K. Havens. 2009. Ecosystem Services and Management of Invasive Species in a Changing System: Response to Martin and Blossey. Conservation Biology, Vol. 23, No. 2, pp. 497-498.

[http://ccrm.vims.edu/publications/pubs/Hershner Havens response Mariin Blossey.pdf](http://ccrm.vims.edu/publications/pubs/Hershner_Havens_response_Mariin_Blossey.pdf)

Havens, K., D. Bilkovic, D. Stanhope, and K. Angstadt. 2009. Location, Location, Location: The Importance Cull Ring Placement in Blue Crab Traps. Transactions of the American Fisheries Society 138(4):720-724.

<http://afsjournals.org/doi/pdf/10.1577/T08-168.1>

Perry, J., D. Bilkovic, K. Havens, and C. Hershner. 2009. Tidal Freshwater Marshes of the Mid-Atlantic and Southeastern United States. In Tidal Freshwater Wetlands, pp. 157-166. Eds: A. Barendregt, D.F. Whigham, A.H. Baldwin; Backhuys Publishers, Leiden, The Netherlands



CCRM Quality Assurance/ Quality Control Policy

The Center for Coastal Resources Management conducts applied research and serves as a scientific advisor to federal, state and local agencies, and the general public. The Center recognizes the importance of how work processes are implemented to ensure that data collected are of the needed and expected quality for their desired use. In order to provide accurate information to user groups, the CCRM is dedicated to an aggressive, proactive Quality Assurance and Quality Control program. A myriad of activities occur within the Center, including direct support of laboratory and field investigations, support and training of graduate students and interns, training of resource agency personnel and the public, direct support of state agencies and local governments, and sponsorship of lectures, seminars, conferences and visiting scientists. Research activities include both field and laboratory measurements and the development and validation of ecological models. The general goal of the CCRM Quality System is to ensure accurate, reproducible, and unbiased data.

Operational Procedures

The Center recognizes the need for specific plans for individual data collection operations to ensure that data or information collected are of the needed and expected quality for their desired use. As a Center, the quality assurance operation procedures differ from that of an individual research contract. Each principal investigator is responsible for submitting a project-specific quality assurance plan to the relevant Program Quality Assurance Manager and the Center Quality Assurance Manager. The principal investigators will use the underlying principles described in this document as a framework for the specific quality assurance and quality control plans for each project. These plans should detail:

- The specific objectives of the project, including the hypothesis to be tested.
- The data quality objective for the variables to be measured.
- The specific sampling and analytical protocols required to meet the data quality objective.
- The individual responsible for quality assurance for the project.

All noncompliance or deviation from the approved quality assurance plan will be reported to the Program Quality Assurance Manager and the Center Quality Assurance Manager. More information about CCRM QA/QC can be found at http://ccrm.vims.edu/about_us/ccrm/CCRM_QMP_aug06.pdf

<http://ccrm.vims.edu/>

**Center for
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